

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended): ~~Method~~ A method for pre-processing speech, ~~in particular in a method for recognizing speech,~~ comprising the steps of:

[[-]] receiving a speech signal; $[(S),]$

[[-]] separating $[[a]]$ an entire spectrum $[(F)]$ of said speech signal $[(S)]$ into a $[[given]]$ number $[(N)]$ of predetermined frequency sub-bands; $(F_1, ..., F_N)$,

[[-]] analyzing said speech signal $[(S)]$ within each of said frequency sub-bands; $(F_1, ..., F_N)$,

[[-]] ~~thereby~~ generating respective band-dependent acoustic feature data $(\Theta_1, ..., \Theta_N)$ for each of said respective frequency sub-bands $(F_1, ..., F_N)$, $[[which]]$ the band-dependent acoustic feature data $(\Theta_1, ..., \Theta_N)$ are being at least in part ~~representa-tive for~~ representative of said speech signal $[(S)]$ with respect to a respective frequency sub-band; $(F_1, ..., F_N)$,

[[-]] deriving band-dependent likelihoods $(b_1, ..., b_N)$ for occurrences of speech elements $(P_1, ..., P_m)$ or of sequences thereof within said speech signal $[(S)]$ based on said band-dependent acoustic feature data; $(\Theta_1, ..., \Theta_N)$ ~~and/or a derivative thereof,~~

[[-]] analyzing said speech signal $[(S)]$ within said entire spectrum; $[(F),]$

[[-]] ~~thereby~~ generating full-band acoustic feature data; ~~$(FBE-F; FFBE; FBE-F-SSUB; O_{F,SSUB})$, which are~~ the full-band acoustic feature data being at least in part representative $[[for]]$ of said speech signal $[(S)]$ with respect to said entire spectrum; $[(F),]$

[[-]] deriving a full-band likelihood $(B_{FF}; B_{SSUB})$ for occurrences of speech elements $(P_1, ..., P_m)$ or of sequences thereof within said speech signal $[(S)]$ based on said full-band acoustic feature data; and ~~$(FBE-F; FFBE; FBE-F-SSUB; O_{F,SSUB})$ and/or a derivative thereof,~~

[[-]] deriving an overall likelihood $[(B)]$ for occurrences of speech elements (P_1, \dots, P_m) or of sequences thereof within said speech signal $[(S)]$ based on said band-dependent likelihoods (b_1, \dots, b_N) and said full-band likelihood (B_{FF}, B_{SSUB}) .

2. (Currently Amended): The method according to claim 1, ~~wherein characterized in that when~~ deriving said overall likelihood $[(B)]$ includes combining said band-dependent likelihoods (b_1, \dots, b_N) ~~are combined~~ to a union model likelihood $(B_{U,MFCC})$ by determining ~~[[the]]~~ a number of uncorrupted frequency sub-bands of said frequency sub-bands (F_1, \dots, F_N) , and adding all possible combinations of products of ~~different~~ the band-dependent likelihoods (b_1, \dots, b_N) corresponding to the respective frequency sub-bands.

3. (Currently Amended): The method according to claim 1, ~~characterized in that~~ wherein the step of generating the band-dependent acoustic feature data comprises generating said band-dependent acoustic feature data (O_1, \dots, O_N) ~~comprise that include~~ comprise that include respective band-dependent mel-frequency cepstral coefficient features, which are based on mel-frequency cepstral coefficients ~~and/or a derivative thereof~~ derived from the respective frequency sub-bands (F_1, \dots, F_N) .

4. (Currently Amended): The method according to claim 1, ~~characterized in that~~ further comprising:

applying a predetermined broadband noise robustness technique ~~is applied~~ prior to deriving said full-band likelihood term (B_{FF}, B_{SSUB}) .

5. (Currently Amended): The method according to claim 4, ~~characterized in that~~ wherein the step of applying the predetermined broadband noise robustness technique

comprises applying said broadband noise robustness technique ~~[[is]]~~ based on a frequency-filtering technique.

6. (Currently Amended): The method according to claim 4, ~~characterized in that~~ wherein the step of applying the predetermined broadband noise robustness technique comprises applying said broadband noise robustness technique ~~[[is]]~~ based on a method of ~~spec-tral~~spectral-subtraction.

7. (Currently Amended): The method according to claim 1, ~~characterized in that~~ wherein the step of generating the full-band acoustic feature data comprises generating said full-band acoustic feature data ~~(FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) comprise that include~~ filter bank energy features ~~(FBE-F)~~, which are based on filter bank energies derived from said entire spectrum ~~[[F]]~~.

8. (Currently Amended): The method according to claim 1, ~~characterized in that~~ wherein the step of generating the full-band acoustic feature data comprises generating said full-band acoustic feature data ~~(FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) comprise that include~~ filtered filter bank energy features ~~(FFBE)~~, which are based on ~~fil-tered~~ filtered filter bank energies derived from said entire spectrum ~~[[F]]~~.

9. (Currently Amended): The method according to claim 1, ~~characterized in that~~ wherein the step of generating said full-band acoustic feature data comprises generating said full-band acoustic feature data ~~(FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) comprise that include~~ full-band mel-frequency cepstral coefficient features, which are based on mel-frequency

cepstral coefficients ~~and/or a derivative thereof de-ri-ved~~ derived from said entire spectrum $[(F)]$.

10. (Currently Amended): The method according to claim 1, ~~characterized in that~~ wherein the step of generating said full-band acoustic feature data and/or said band-dependent acoustic feature data comprises generating said full-band acoustic feature data $(FBE; FFBE; FBE-F_{SSUB}; O_{F,SSUB})$ and/or said band-dependent acoustic feature data $(\Theta_1, \dots, \Theta_N)$ ~~comprise that include~~ include PLP-linear prediction filter features, which are based on PLP-linear prediction ~~fil-ter~~ filter coefficients.

11. (Currently Amended): The method according to claim 1, ~~characterized in that~~ wherein the step of generating the full-band acoustic feature data comprises generating said full-band acoustic feature data $(FBE; FFBE; FBE-F_{SSUB}; O_{F,SSUB})$ ~~comprise that include~~ spectrally-changed full-band mel-frequency cepstral coefficient features $(O_{F,SSUB})$, which are generated by applying a method of spectral ~~sub-traction~~ subtraction to said full-band mel-frequency cepstral coefficient features $[(O_F)]$.

12. (Currently Amended): The method according to claim 1, ~~characterized in that~~ further comprising:

determining, using a probability estimator, said band-dependent likelihoods (b_1, \dots, b_N) and said full-band likelihood term $(B_{FF}; B_{SSUB}; B_{U,FF})$ ~~are determined using a probability estimator.~~

13. (Currently Amended): The method according to claim 1, ~~characterized in that~~ further comprising:

deriving said filtered filter bank energies (~~FFBE~~) ~~are derived~~ from said filter bank energies $[(FBE)]$ by subtracting $(f(i) = f(i+1) - f(i-1))$ a first filter bank energy $[(FBE_{i-1})]$ from a second filter bank energy $[(FBE_{i+1})]$, wherein said first filter bank energy $[(FBE_{i-1})]$ corresponds to a first discrete frequency and said second filter bank energy $[(FBE_{i+1})]$ corresponds to a second discrete frequency, lying two discrete frequency steps after said first filter bank energy $[(FBE_{i-1})]$.

14. (Currently Amended): ~~Speech~~ A speech pre-processing system, ~~in particular integrated into a speech processing system, which is capable of performing or realizing a method for pre-processing speech according to claim 1 and/or the steps thereof comprising.~~

means for receiving a speech signal;

means for separating an entire spectrum of said speech signal into a number of predetermined frequency sub-bands;

means for analyzing said speech signal within each of said frequency sub-bands;

means for generating respective band-dependent acoustic feature data for each of said respective frequency sub-bands, the band-dependent acoustic feature data being at least in part representative of said speech signal with respect to a respective frequency sub-band;

means for deriving band-dependent likelihoods for occurrences of speech elements or of sequences thereof within said speech signal based on said band-dependent acoustic feature data;

means for analyzing said speech signal within said entire spectrum;

means for generating full-band acoustic feature data, the full-band acoustic feature data being at least in part representative of said speech signal with respect to said entire spectrum;

means for deriving a full-band likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said full-band acoustic feature data; and

means for deriving an overall likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said band-dependent likelihoods and said full-band likelihood.

15. (Cancelled).

16. (Currently Amended): ~~Computer~~ A computer readable storage medium, having embedded therein computer executable instructions, wherein the instructions, when executed by a processor, cause the processor to perform a method comprising:

~~comprising a computer program product according to claim 15~~

receiving a speech signal;

separating an entire spectrum of said speech signal into a number of predetermined frequency sub-bands;

analyzing said speech signal within each of said frequency sub-bands;

generating respective band-dependent acoustic feature data for each of said respective frequency sub-bands, the band-dependent acoustic feature data being at least in part representative of said speech signal with respect to a respective frequency sub-band;

deriving band-dependent likelihoods for occurrences of speech elements or of sequences thereof within said speech signal based on said band-dependent acoustic feature data;

analyzing said speech signal within said entire spectrum;

generating full-band acoustic feature data, the full-band acoustic feature data being at least in part representative of said speech signal with respect to said entire spectrum;

deriving a full-band likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said full-band acoustic feature data; and

deriving an overall likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said band-dependent likelihoods and said full-band likelihood.